

Sustaining New York City

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Sustaining New York City

Unit Overview:

Students will learn about ways to be a more sustainable citizen in New York City. Throughout the unit students will be given case studies, readings, labs, presentations, media, and participate in a field trip relating to “sustainability.” The last two full weeks of the unit will have students choosing an issue or problem in New York City relating to sustainability and researching on that problem.

Week One: What is sustainability?

Lesson 1: What is sustainability?
Lesson 2: Climate Change
Lesson 3: Climate Change (Lab)
Lesson 4:

Week Two: Sustainability in NYC

Lesson 5: Lowering Your Carbon Footprint
Lesson 6: Renewable Energy (Lab)
Lesson 7: Waste “Management”
Lesson 8: Sustainable Food

Week Three: Water and NYC

Lesson 9: Why is water important?
Lesson 10: The Water Cycle
Lesson 11: Our water supply
Lesson 12: Designing an Aqueduct (Lab)
SS Extension: Water’s Role in NYC History
SS Extension: The Croton Aqueduct

Week Four: Water and Air Pollution

Lesson 13: Water Pollution
Lesson 14: Design a Water Filtration System (Lab)
Lesson 15: Sources of Air Pollution
Lesson 16: Curbing Carbon Emissions
SS Extension: UN and Climate Change

Week Five: Renewable Energy

Lesson 17: Solar Energy
Lesson 18: Wind Energy
Lesson 19: Hydroelectric Energy
Lesson 20: Geothermal Energy
Math Extension: How much does that give us?

Week Six: Green Infrastructure/Designing for Change

Lesson 21: Types of Green Infrastructure
Lesson 22: Designing
Lesson 23:
Lesson 24:
ELA Extension: Writing for Change (City Council)
Math Extension:

Week Seven: Designing for Change

Lesson 25:
Lesson 26:
Project Work Day 2:
Project Work Day 3:

Week Eight: Present Findings to “City Council”

Finalize Project: Work Day
Project Presentations
Project Presentations

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Essential Questions and Big Ideas

- How can we be more sustainable in our daily lives here in New York City?
- What does it mean to be sustainable?
- What does it mean to be Green?
- How can we use the design process to think about sustainability?
- What are different types of renewable energy?
- What is climate change? What causes it? What are the effects of it?
- Using the scientific model to analyze and understand our world
- Using research and design skills to solve problems

Final Project and Assessment: Designing Green Infrastructure and Raising Awareness Campaign

- City Council is asking for proposals for the “Sustaining New York City: Green Design and Raising Awareness”
- Students will choose whether they will be designing green infrastructure, developing an awareness campaign about a local or regional issue relating to sustainability, or a combination of both.
- Students will learn about different ways to be sustainable

- **Sustainability**
- **Conserve**
- **Being Green**
- **Reduce**
- **Reuse**
- **Conserve**
- **Rethink**
- **Imagine**
- **Discover**
- **Recycle**
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Learning Standards

Next Generation Science Standards

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.]

5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

CCLS Math

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

CCLS Literacy Standards

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1), (5-ESS2-2) (5-ESS3-1)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-ESS2-2) (5-ESS3-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1), (5-ESS2-2)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS3-1)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-ESS3-1)

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Lesson 1: What does “sustainability” mean?

Learning Target:

- Explain what it means to be sustainable in student’s own words
- Give at least 3 examples of ways you can be sustainable

Essential Question(s):

- What does the term “sustainability” mean?
- What are ways to be sustainable?

Standards Connection

NGSS:

n/a

CCLS Mathematics

n/a

CCLS Literacy

RI.5.7

RI.5.9

Opening of the Lesson

Blast-Off (5 minutes):

- Students in their Science Notebooks will create a circle map using the word “Sustainability” or “Being Green” as their focus
- Teacher will remind students to include their “Context” at the end of the four minutes.

Comparing Circle Maps (10 minutes)

- On separate pieces of chart paper, teacher will have “Sustainability” and “Being Green” Circle Maps ready. Students will volunteer the words they have on their Circle Maps and the teacher will write them down.
- Teacher “What are some differences between the two Circle Maps?”
- Students will volunteer a few answers
- Teacher: “What are some similarities between the two Circle Maps?”
- Students will volunteer a few answers
- Teacher: “Using the information on the chart paper and in your science notebook, take 4 minutes to create a Double Bubble Map

Vocabulary Definitions (5 minutes)

- Students will copy down the four vocabulary words (sustainability, reduce, reuse, & conserve) on the Graphic Organizer SNYC.1

Content Vocabulary

- Sustainability
- Reduce
- Reuse
- Conserve

Materials

- Science notebook
- Pencil or pen
- Keynote Presentation
- Projector
- Audio Equipment
- Computer
- Chart Paper
- Graphic Organizer SNYC.1
- Exit Slip SNYC.1

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Middle of the Lesson

Meet the Greens (5 minutes)

- Students will watch Meet the Green's Episode 3 one time.
- Teacher will ask, what they heard and learned from the lesson.
- Students will watch Meet the Green's Episode 3, again, and take notes in their Graphic Organizer SNYC.1

Reduce, Reuse, Conserve (8 minutes)

- Mr. Heath will present why we should "Reduce, Reuse, Conserve" and examples of of it from Keynote Presentation SNYC.1
- Students will take notes in their Graphic Organizer SNYC.1
- In between each of the three sections, Mr. Heath will have students volunteer examples of how they "Reduce, Reuse, Conserve"

End of the Lesson

Brainstorm (10 minutes)

- Students will work in their groups (which will be heterogeneous for this lesson) to brainstorm what they think "the best 5 ways they can be more sustainable" at school and/or home.

Landing: (2 minutes)

- Students will complete Exit Slip SNYC.1 before they leave the classroom

Homework

None today, but students would be encourage to explore links put on "Mr. Heath's STEM Teacher Blog"

Differentiation

- Graphic Organizers for note taking and to enhance understanding
- Integration of multimedia for more engagement
- Mix of group work and independent work
- Images are used in the Keynote presentation in conjunction with vocabulary words

Student Grouping

Group A (Brooklyn)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Group B (Bronx)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Group C (Manhattan)

- 1.
- 2.
- 3.
- 4.
- 5.
- 7.
- 8.

Group D (Queens)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

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Middle of the Lesson		Student Grouping Group A (Brooklyn) 1. 2. 3. 4. 5. 6. 7. 8. Group B (Bronx) 1. 2. 3. 4. 5. 6. 7. 8. Group C (Manhattan) 1. 2. 3. 4. 5. 7. 8. Group D (Queens) 1. 2. 3. 4. 5. 6. 7. 8.
End of the Lesson	Differentiation	
Landing:		
Homework		

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Lesson 2: Climate Change

Learning Target: How does climate change affect our lives?

- Define what it means to be sustainable
- Give at least 3 examples of ways you can be sustainable

Objective:

Essential Question(s):

- What does the term “sustainability” mean?
- What are ways to be sustainable

Standards Connection

NGSS:

CCLS Mathematics

CCLS Literacy

Opening of the Lesson

Blast-Off:

Materials

- Science notebook
- Pencil or pen

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Standards Connection

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CCLS Mathematics

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Opening of the Lesson

Blast-Off:

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Middle of the Lesson

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Group D (Queens)

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- 8.

End of the Lesson

Landing:

Differentiation

Homework